UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/477,910	01/05/2000	PATRIK LARSSON	LARSSON-20-1	9899

27997	7590	05/26/2004	EXAMINER	

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EXAMINER
JAMAL, ALEXANDER

ART UNIT	PAPER NUMBER
2643	12

DATE MAILED: 05/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _18 March 2004_.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-26_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _19-21 and 23-25_ is/are allowed.

6)☒ Claim(s) _1-18 and 23-25_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All   b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

Response to Amendment

1.   Applicant's arguments with respect to claims 1-18 have been considered but are moot in

view of the new ground(s) of rejection.

2.   Examiner acknowledges that **claims 23-26** have been added.

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

1.   **Claims 1-12, 16-17,22,26,** are rejected under 35 U.S.C. 103(a) as being unpatentable

over Crochiere et al. (5664011), and further in view of Golla et al. (5724395).

As per **claim 1,** Crochiere describes an echo canceller (which would also cancel

out near-end-crosstalk) comprising a first filter (Fig. 2, reference 128) and a means to

subtract the filtered output signal from the original input signal (Fig. 1 and Col. 3,

paragraph 8). However Cochiere does not mention a second FIR filter in parallel with

the first filter, or means to partition the input data signal such that a portion of the input

signal is processed by each FIR filter with the filters acting in parallel, or that the filters

are, in fact FIR filters.

Golla teaches that using a single higher resolution filter requires more memory

(which requires more power), and more integrated circuit space (Col 1, paragraph. 4-5).

In order to help solve these problems Golla teaches the use of two smaller resolution FIR

filters in which a data word is partitioned and a most-significant-bit portion is filtered by

one FIR filter, and the remaining least-significant-bits are filtered by the second FIR filter

(Fig. 3, Col.4, lines 49-58). Golla shows an additional embodiment of his teachings in

which a second FIR filter 2 (Fig. 4) processes a second portion of the partitioned data

signal (XM(n)) comprising A0-A7 and B0-B7 that has a data size greater than the first

portion of partitioned data (XL(n)) that is processed by a first FIR filter (Col 4 lines 58-

64). In view of Golla, it would have been obvious to one skilled in the art to apply

Golla's solution when faced with the problems of higher resolution filters taking up too

much space and drawing too much power, for the purpose of reducing the size and power

draw of the circuitry. In view of Golla's solution applied to Cochiere's design it would

have been obvious that adaptive filter 128 (CROCHIERE: Fig. 2) could have been

implemented with two adaptive filters in parallel and also with means to partition the

input data signal such that a portion of the input signal is processed by each FIR filter for

the purpose of reducing the size and power draw of the circuitry.

Additionally, the examiner takes official notice that it is notoriously well known

in the art to use FIR filters for adaptive echo canceling (such as the adaptive filter 128 in

Fig. 2 of Crochiere). The evidence for this is presented by Crochiere in his disclosed well

known prior art Fig. 1 (Col 3 line 45 to Col 4 line 37).

As per **claims 22,26,** the claims rejected as the method would be performed by the

device specified in the rejection of claim 1. Since the filters in Crochiere's system will

be used to create a signal to cancel an echo or crosstalk signal, the method inherently

comprises determining the maximum bit resolution of the largest amplitude (highest bit

resolution) echo signal for the purpose of determining the appropriate filter resolution.

Golla's teachings show that a data signal is divided into equal half parts and processed by

the filters with bit resolutions equal to half of the maximum bit resolution (Golla Fig. 3).

Golla's Fig. 4 as described in the rejection of claim 1, shows the two filters processing

the two sets of data. Each set of partitioned data would cancel out a portion of the echo

signals as per Crochiere's design. Examiner notes that Golla's solution applied to

Crochiere's design would comprises either filter 128 or filter 126 being implemented as

two smaller filters operating in parallel.

As per **claim 2,** Crochiere mentions an adaptable filter (Col. 1 paragraph 5) that is

able to adjust its filter output values by adjusting it's filter coefficients based on an error

signal.

As per **claim 3,** Golla's solution comprises two separate integrated circuits (Figs.

1-4).

As per **claims 4 and 5,** Crochiere's echo canceller has an FIR filter containing a plurality of registers (filter elements).

As per **claim 6,** Golla's solution claims a plurality of processors arranged in parallel and coupled to the means for splitting the input signal such that each portion of the partitioned input signal is sent to a separate processor (Golla's Claim 5).

As per **claim 7,** Golla's solution describes that the input signal partition separates the most significant bits and the least significant bits. (Fig. 3 and Col 4, lines 49-58).

As per **claims 8 and 9,** Crochiere describes subtracting the filtered signal from the original input signal (Abstract). With Golla's solution in mind, it would be obvious to subtract each separate filtered partition from the original input signal.

As per **claims 10 and 11,** Crochiere's device includes both an adaptive and non-adaptive filter, with both filters being used to remove portions of an echo signal. When applying Grolla's solution it would be obvious that either the adaptive or non-adaptive filter could be implemented as two smaller filters in parallel.

As per **claim 12:** Both Crochiere and Grolla mention the use of digital filters.

As per **claims 16 and 17,** Crochiere's device includes taps, delay lines and registers (Fig. 3 and Col. 6) in order to vary the output values of a filter.

2.   **Claims 13-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Crochiere et al. (5664011) and Golla et al. (5724395) as applied to claim 1, and further in view of Maulik et al. (6260053).

As per **claims 13-15,** Crochiere and Golla describe applicant's claim 1, but do not

mention the using both FIR filters in either direct-form or transpose-form, or using one

FIR filter in direct-form and the other in transpose-form.

Maulik teaches that a scalable filter architecture can be implemented in transpose

form, and that a scalable filter architecture allows parallel and distributed processing (Col

3, lines 40-53). Maulik also teaches that the transfer function of a direct form filter is

identical to that of a transpose form of the filter (Figs. 4-5 Col 6, line 53 to Col. 7 line

26). It would have been obvious to one skilled in the art, that two FIR filters, used to

process distributed data could each be configured in any combination of direct or

transpose-form in order to perform their function.

3.   **Claim 18** rejected under 35 U.S.C. 103(a) as being unpatentable over Crochiere et al.

(5664011) and Golla et al. (5724395) as applied to claim 1, and further in view of Walker et al.

(5570423).

As per **claim 18,** Crochiere and Golla describe applicant's claim 1, but do not

specify using either fixed or floating-point numbers in the filters.

Walker teaches that fixed-point numbers may be used in an FIR filter used in an

echo canceller circuit. He also teaches that the same gain can be achieved with a less-

expensive fixed-point FIR filter as with a more expensive floating point FIR filter. (Col.

9, line 64 – Col. 10, line 13). It would have been obvious to one skilled in the art that

fixed-point numbers could be used when implementing the FIR filters in order to provide

a more cost effective solution.

Allowable Subject Matter

4.   **Claims 19-21, 23-25** are allowed over the prior art of record.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Alexander Jamal whose telephone number is 703-305-3433. The

examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Curtis A Kuntz can be reached on 703-305-4708. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-872-9306 for regular

communications and 703-872-9315 for After Final communications.

AJ
May 18, 2004

CURTIS KUNTZ
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